

What is claimed is:

1. A rectangular waveguide comprising:

a pair of main ground electrodes disposed so as to face each other in parallel with each other with a dielectric in between; and

a pair of side walls, each side wall constructed of a plurality of sub ground electrodes provided between the pair of main ground electrodes, the sub ground electrodes stacked in parallel with the main ground electrodes with a interval along a direction orthogonal to the main ground electrodes,

wherein electromagnetic waves in the TM mode propagate in a region surrounded by the pair of main ground electrodes and the pair of side walls.

2. The rectangular waveguide according to claim 1, wherein the width of each of the sub ground electrodes is specified as length L or longer,

when the interval is "a", frequency of the electromagnetic wave is "f", dielectric constant of the dielectric is ϵ_r , light velocity is "c", and natural logarithm is "e", the interval "a" and the length L satisfy the following equation (1).

$$L \times ((\pi/a)^2 - (2 \times \pi \times f/c)^2 \times \epsilon_r)^{1/2} \geq 1/\log_{10} e \quad \dots (1)$$

3. The rectangular waveguide according to claim 1, further

comprising resistor layers formed, in regions apart from an inner end face of each of the sub ground electrodes more than the length L, on both faces of each of the sub ground electrodes, and formed, in a region facing the regions, on each of the main ground electrodes.

4. The rectangular waveguide according to claim 2, further comprising resistor layers formed, in regions apart from an inner end face of each of the sub ground electrodes more than the length L, on both faces of each of the sub ground electrodes, and formed, in a region facing the regions, on each of the main ground electrodes.

5. The rectangular waveguide according to claim 1, further comprising a wave absorbent layer formed so as to extend between the main ground electrodes on the side of outer end faces of the sub ground electrodes.

6. The rectangular waveguide according to claim 2, further comprising a wave absorbent layer formed, so as to extend between the main ground electrodes, on the side of outer end faces of the sub ground electrodes.

7. The rectangular waveguide according to claim 3, further comprising a wave absorbent layer formed, so as to extend between the main ground electrodes, on the side of outer end faces of the sub ground electrodes.

8. The rectangular waveguide according to claim 4, further comprising a wave absorbent layer formed, so as to extend between the main ground electrodes, on the side of outer end faces of the sub ground electrodes.